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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/564,073

01/10/2006

Masakazu Kawai

SAT-16451

6001

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RANKIN, HILL & CLARK LLP
38210 GLENN AVENUE
WILLOUGHBY, OH 44094-7808

EXAMINER

DANEGA, RENEE A

ART UNIT

PAPER NUMBER

3736

NOTIFICATION DATE

DELIVERY MODE

06/14/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

40854@rankinhill.com
spaw@rankinhill.com

Office Action Summary	Application No. 10/564,073	Applicant(s) KAWAI ET AL.	
	Examiner Renee Danega	Art Unit 3736	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dariush (US 20030018283) in view of Takenaka (US 6289265).

3.

- Regarding claim 1, Dariush teaches a method of estimating a joint moment of a bipedal walking body, comprising:

a first step for sequentially grasping the displacement amounts of a plurality of joints, including at least an ankle joint, a hip joint and a knee joint of each leg of a bipedal walking body (Figures 13-14-15) [0012] [0062];

a second step for sequentially grasping the positions and/or postures of corresponding rigid bodies of the bipedal walking body that are associated with rigid elements of a rigid link model using at least the rigid link model, the rigid link model being established beforehand to express the bipedal walking body in the form of a link assembly composed of a plurality of the rigid elements and a plurality of joint elements and the grasped displacement amounts of the joints [0088] (Figure 2);

a third step for grasping the acceleration of a preset reference point of the bipedal walking body [0094]

and a fourth step for sequentially grasping a floor reaction force acting on each leg and the position of an acting point of the floor reaction force, the grasped positions and/or the postures of the corresponding rigid bodies of the bipedal walking body, the acceleration of the reference point, the floor reaction force, and the position of the acting point of the floor reaction force being used to estimate a joint moment acting on at least one joint of each leg, wherein at least the displacement amounts of the hip joint, the knee joint, and the ankle joint of each leg that are grasped in the first step include the amount of rotation about an axis substantially perpendicular to a leg plane as a plane passing through these three joints, a posture of a leg coordinate system which is fixedly set to the leg plane is changeable with respect to a body coordinate system which is fixedly set to the bipedal walking body, the displacement amount of the hip joint is a three-dimensional amount, the positions and/or postures of the corresponding rigid bodies grasped in the second step include at least the positions and/or the postures of the corresponding rigid bodies of the leg on the leg plane, the acceleration of the reference point grasped in the third step and the floor reaction force and the position of the acting point of the floor reaction force grasped in the fourth step are three-dimensional amounts, and a component of a joint moment acting on at least one joint of the leg about the axis that is substantially perpendicular to the leg plane is estimated on the basis of an inverse dynamic

model representing the relationship between the motions of the corresponding rigid bodies of the leg and the translational forces and the moments acting on the corresponding rigid bodies on the leg plane by using the two- dimensional amounts obtained by projecting at least the acceleration of the reference point, the floor reaction force, and the position of the acting point of the floor reaction force onto a leg plane related to the leg on the basis of a displacement amount of the hip joint of the leg, and the positions and/or the postures of the corresponding rigid bodies of the leg on the leg plane [0062] [0094] [0098] (Figure 5, 7).

Dariush teaches using acceleration but doesn't expressly teach collecting the acceleration data. However, Takenaka teaches a method for controlling and estimating joint movement of a bipedal walking body in which hip knee and ankle joint displacements are measured

by using at least an output of an acceleration sensor means (60) attached to a predetermined region of the bipedal walking body (S31) in order to determine posture stability (Figures 1, 10). It would have been obvious in view of Takenaka to provide an acceleration sensor in Dariush and measure acceleration from that point in order to determine posture stability.

- Regarding claim 2, Dariush teaches the method may be extended to three dimensional systems [0098] but doesn't expressly teach finding values in the third and fourth step in three-dimensional amounts. However, Takenaka teaches finding joint moments by finding three-dimensional acceleration of a reference point, floor reaction force, and point of the

acting point of the floor reaction force (Figures 1, 17) (column 11, lines 12-30). It would have been obvious to one of ordinary skill in the art to modify the method as taught by Dariush with the three dimensional methods and of Takenaka in order to increase the efficacy of controlled movement in a biped walking system.

- Regarding claims 3-5, Dariush teaches determining the overall center of gravity based on joint displacement of legs. Dariush teaches determining center of gravity by using displacement amounts of the joints and of the floor reaction and inclination angle relative to vertical of the ankle and toe joint wherein he determines whether the body is in a one-leg or two leg supporting state [0052] [0053] but doesn't expressly teach center of gravity exists rearward or forward of the body. However, Takenaka teaches determining center of gravity to be rearward when the ankle joint contacts the ground and forward the body when the toe joint contacts the floor. It would have been obvious to one of ordinary skill in the art to modify the method as taught by Dariush with the center of gravity estimates of Takenaka in order to increase the efficacy of controlled movement in a biped walking system.
- Regarding claims 6-7, Kato doesn't expressly teach the acting point of a reaction force as a position away downward from a specified value. However, Takenaka teaches the estimate of the vertical position of the acting point of a floor reaction force acting on a leg in contact with the

ground at the toe or ankle as the position away downward in the vertical direction by a predetermined value specified beforehand (Figures 6, 7). It would have been obvious to one of ordinary skill in the art to modify the method as taught by Dariush with the three dimensional methods and of Takenaka in order to increase the efficacy of controlled movement in a biped walking system.

Response to Arguments

4. Applicant's arguments, filed 3/26/10 have been considered but were not found to be persuasive.
5. Dariush teaches finding rotational displacement of each of the ankle, knee and hip all in the same plane the x-y plane of the page about an axis substantially perpendicular, or the z-axis coming out of the page as θ_1 , θ_2 and θ_n in Figure 2 and 7. Dariush teaches the method can be performed in three dimensions rather than two and that since the model is a linked model, the measurements and calculations for each joint are done sequentially starting at a point zero [0012] [0062]. Additionally, Takenaka has been incorporated and as indicated in claim 2 teaches that the measured amounts should be three dimensional values.
6. Dariush teaches a general coordinate system such that the x-axis is always pointed forward and y vertically. Dariush further teaches a posture coordinate system that moves with the body at each joint changing during moving.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renee Danega whose telephone number is (571)270-3639. The examiner can normally be reached on Monday through Thursday 8:30-5:00 eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Max Hindenburg can be reached on (571) 272-4726. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3736

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RAD

/Max Hindenburg/
Supervisory Patent Examiner, Art Unit 3736